Grid Tie Solar Inverter

EnerSolis Series

ES 6000
ES 8000
ES 10000
ES 12000

Three-Phase , 6 / 8 / 10 /12 kW
User's Manual

Contents

1 Foreword

Thank you for purchasing the EnerSolis ES 6000(ES 8000/ES 10000/ES 12000) Grid Tie Solar Inverter. Many years of experience in the design of power devices have gone into the construction of this device. We hope that it will give your solar power system many years of trouble-free operation. However, the inverter is a complex electronic system which is confronted with a wide variety of local conditions, so if questions arise or a malfunction occurs do not hesitate to call your specialized dealer for assistance.

Please read this user's guide carefully to familiarize yourself with the device, paying special attention to the information on installing and commissioning the device.

2 IMPORTANT SAFETY INSTRUCTIONS

■General

Warning! Incorrect operation and work performed incorrectly can cause damage and serious injury! Only qualified staff are authorized to install your inverter, and only within the scope of the respective technical regulations. Do not start operation or carry out maintenance work before you have read the chapter "Safety Regulations"!

● **This manual contains important instructions for the ES 6000(ES 8000/ES 10000/ES 12000) that must be followed during installation and maintenance of the inverter.**

Warning! These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

■Housing
● **Only qualified installers are authorized to open the connection area. Do not open the connection area when the inverter is connected to power.**
● **Only well-trained service staff may open the upper portion (power stage) of the inverter, and only when it is not connected to power.**

■Warning

Below warning symbols are described according to related sections:

Symbol	Description
	Caution, risk of electric shock !
	Caution, risk of danger !
	Caution , hot surface ! The PV inverter surface temperature of the casing can exceed **+70 ℃** .
2min30S	**Caution, risk of electric shock Energy storage timed discharge !**
	Refer to the operating instructions !

■Repair

Only well-trained service staff are authorized to carry out repairs to the inverter.

■Solar panels

Before connecting the solar panels (also called *photovoltaic (PV) modules*), you must check whether the voltage parameters specified in the manufacturer's data correspond with the actual parameters. When checking the voltage please take into account that solar modules supply a higher no-load voltage when temperature is low and sunlight level remains unchanged. At 4 ℉ (-20 ℃) the open-circuit voltage of the PV modules must never exceed 1,000 V. The data sheet of the solar module will include the temperature factors applicable for ascertaining the theoretical open-circuit voltage at 4 ℉ (-20 ℃) . If the solar modules exceed an open-circuit voltage of 1,000 V the PV inverter might be damaged, which will void the warranty.

The PV inverter includes a residual current monitoring unit (RCMU) according to VDE0126-1-1. This device measures the ground current of the PV array and prevents the inverter from feeding the grid in case of a ground fault.

■Grid connection

Only appropriately licensed contractors are authorized to connect the PV inverter to the grid. Consult your local authorities for specific requirements. Before connecting the PV inverter to the grid, permission for the connection must be granted by the utility company.

3 Overview

3.1 External dimensions

Front view

Bottom view
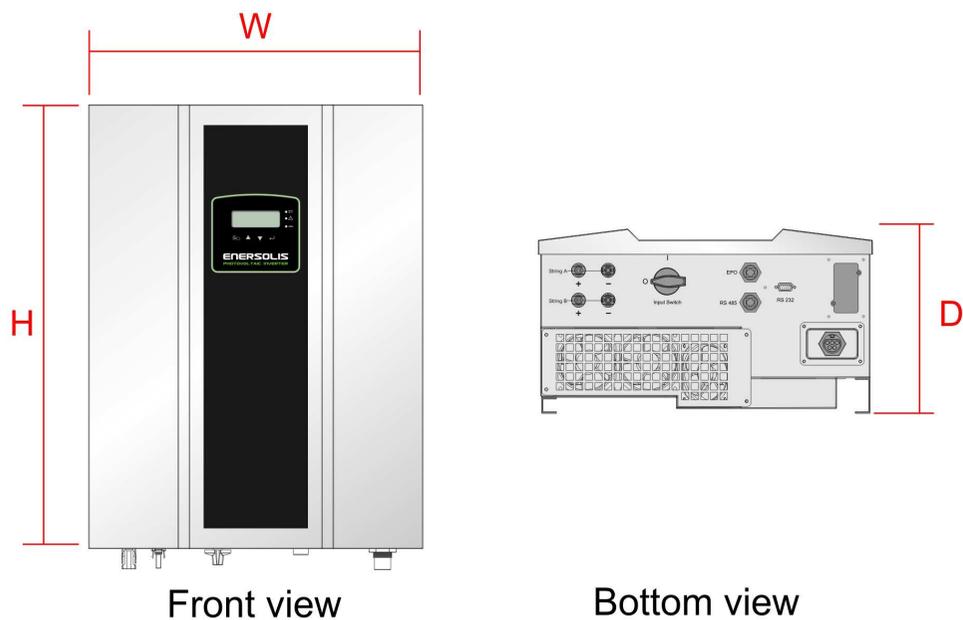
Model number Dimensions (mm)	ES 6000	ES 8000	ES 10000	ES 12000
W	451	451	451	451
H	595	595	595	595
D	247	247	247	247

3.2 External features
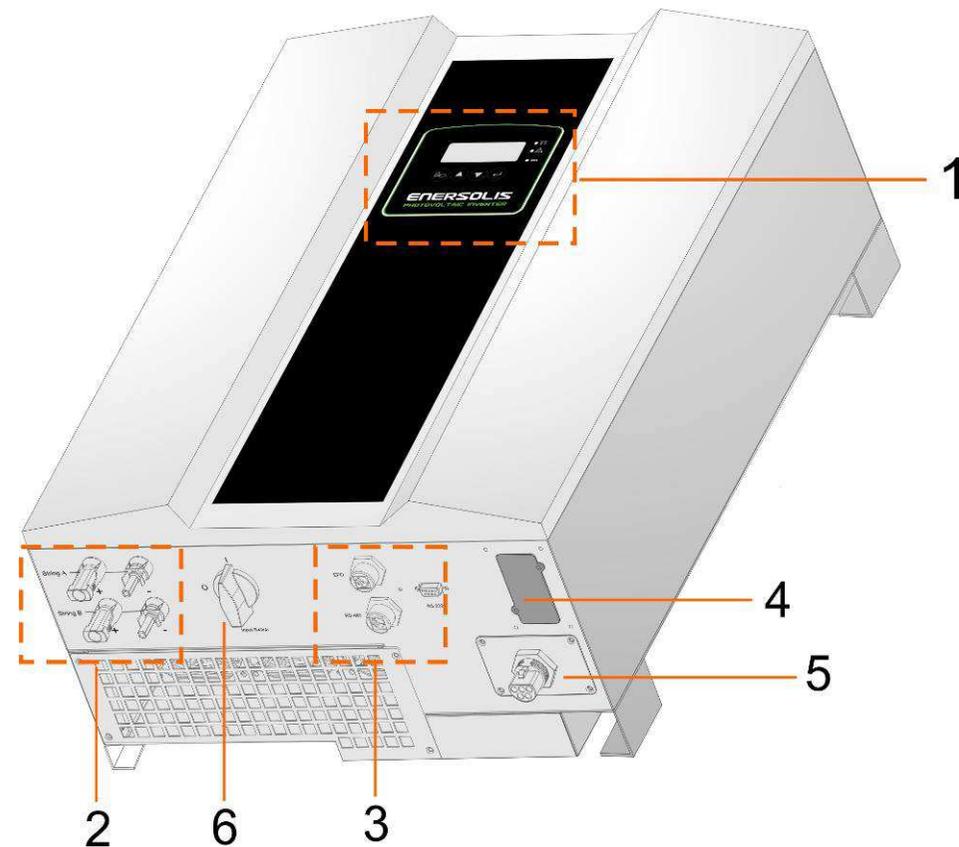
1. LCD and LED display: Shows operation information and status.

2. Solar array input: plug-and-play connectors for the solar modules

3. Standard communication ports: EPO, RS-232, and RS-485

4. Optional communication slot: USB, RS-485, Dry-Contact, TCP/IP, or WiFi。

5. AC output terminal: AC output for the utility supply

6. DC input switch: switches the PV string inputs on and off

4 Installation

Warning: Be sure to read the safety instructions on pages 3 and 4 before installing the PV inverter.

4.1 Unpacking

Inspect the PV inverter upon receipt. The packaging is robust, but accidents and damage may still occur during shipment. Notify the forwarder and dealer if there is damage.

The packaging is recyclable and reusable.

After removing the inverter from the carton check for the following standard package contents, in addition to the inverter itself.

✓ accessories set (cover, PV connector)

✓ CD-ROM

✓ A wall mount kit set (backrest and backplane positioning paper)

4.2 Installation requirements

The PV inverter is heavy. Take this weight into account when choosing the installation site and method of installation.

To ensure proper operation and long operating life, position the inverter according to the following requirements:


(1) ES 6000(ES 8000/ES 10000/ES 12000) are designed to comply with Index of Protection class 65, which allows units to be installed in outdoor and wet environment . The PV inverter is designed for outdoor installation. It should be installed in a place here it is not exposed to direct sunlight. The yield of the PV system may be reduced at increased ambient temperatures or when installed in poorly ventilated and warm indoor locations. We recommend an ambient temperature range of -20℃ to +60 ℃ .
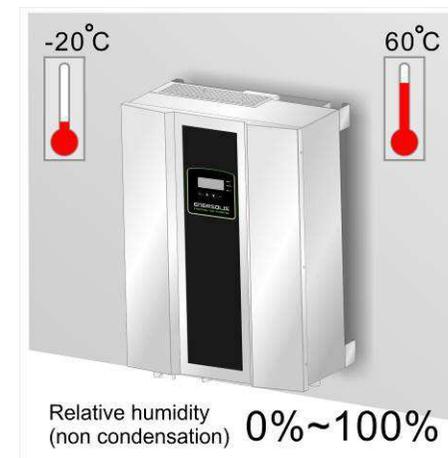
(2) The PV inverter is designed to be mounted on a vertical wall. If installing the
unit outdoors make sure that it is not slanting forward.

We advise against installing the unit in a horizontal position outdoors.
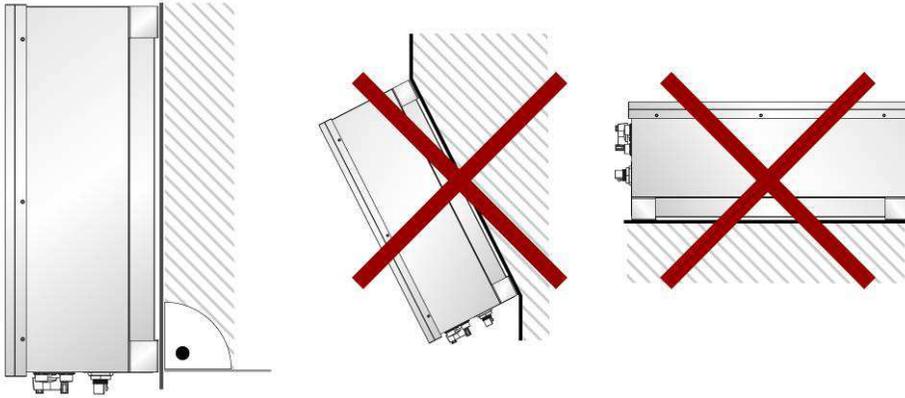
Install the inverter vertically or
tilting backward.

Never install the inverter horizontally
or so that it tilts forward.

(3) When choosing the installation site ensure that there is enough space for
heat dissipation. Under normal conditions the following clearance guidelines
should be applied:
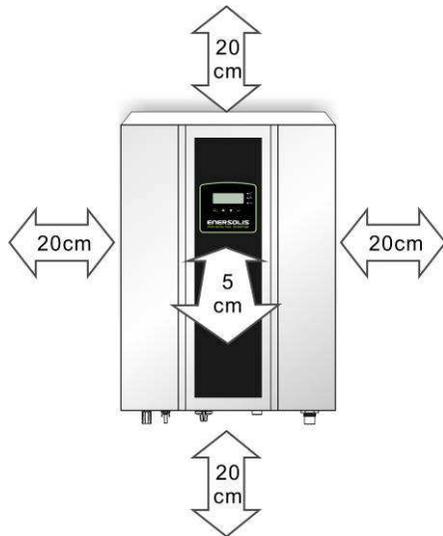
4.3 Mounting the unit

For vertical installation and installation on solid concrete or block walls, when
selecting the mounting hardware be sure to take into account the weight of the PV
inverter.
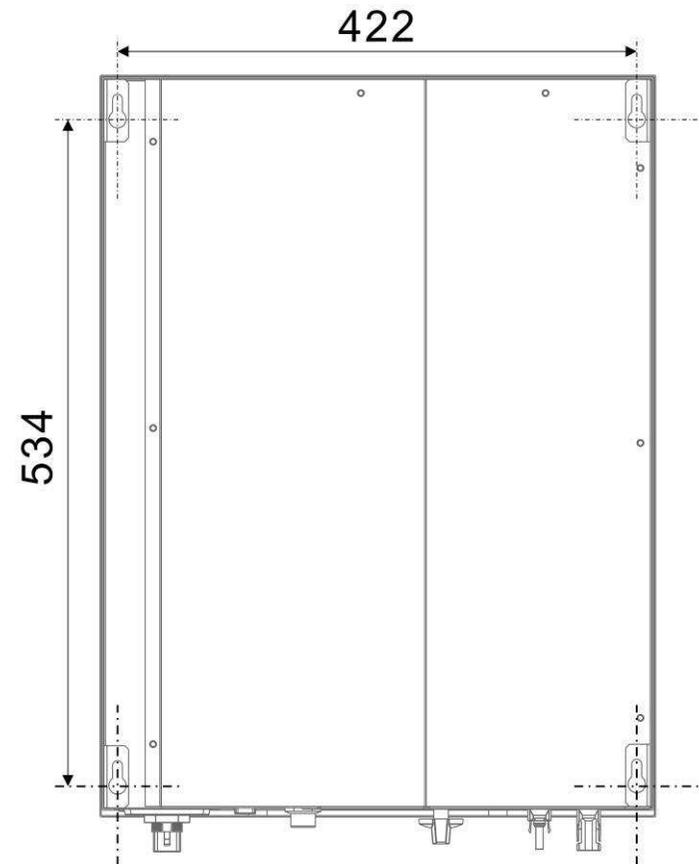
The procedure for mounting the inverter is described on the following page.

4.3.1 Using the mounting bracket

Method I: Use the backplane to fix the unit

Step 1. Put the backplane position paper on the intended spot of the wall.

Drill holes based on the diameter of the backplane to fix holes. Finally

, fix the backplane on the wall.
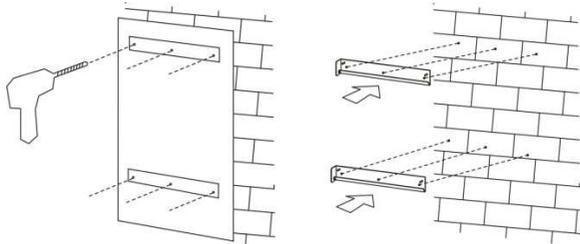
Step 2. Screw the nut on the sleeve without fastening.
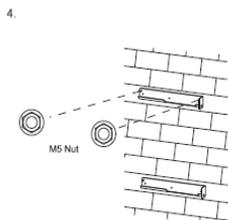
Step 3. Hang the PV inverter on the backplane. Make sure that it holds the

inverter unit firm and securelyFinally, fastening the nut.
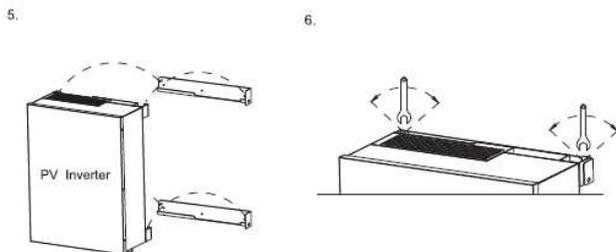
Method II: Use screws to fix the unit

Step 1. Mark the positions to drill the holes and setting screw.
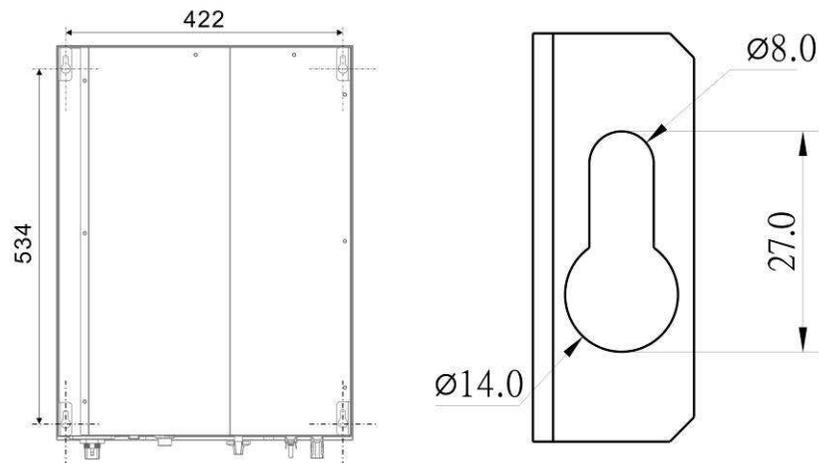
Step 2. Hang the PV inverter on the wall that it cannot be moved sideways.
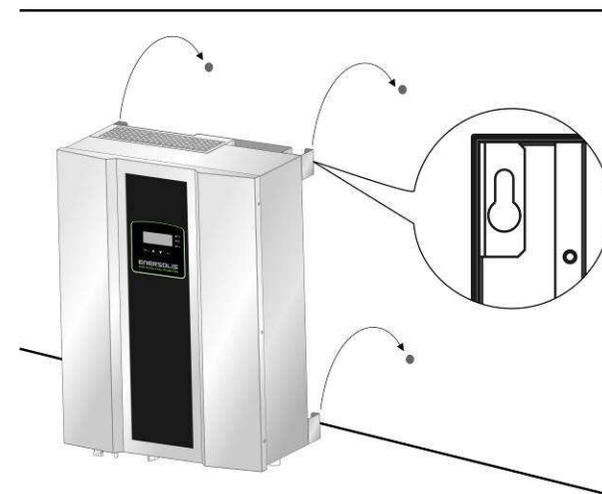
Step 3. Make sure that the PV inverter is positioned securely on the bracket.

4.4 Electrical installation

 Caution ! Risk of electric shock !

■ Make sure the AC breaker or switch installed between the PV Inverter and the grid (AC Utility).

  Note：Please use **Ue: 690Vac / Ie:25A** circuit breaker.

■ Make sure the DC breaker or switch installed between the PV Inverter and the PV array.

  Note：Please use **Ue: 1000Vdc / Ie:25A** circuit breaker.

■ When working on the PV inverter, disconnect the AC breaker or switch and DC breaker or switch.

■ Make sure that the AC breaker or switch and DC breaker or switch cannot be unintentionally closed during installation and commissioning works.

   The electrical connections for the PV inverter are shown in Figure 1.
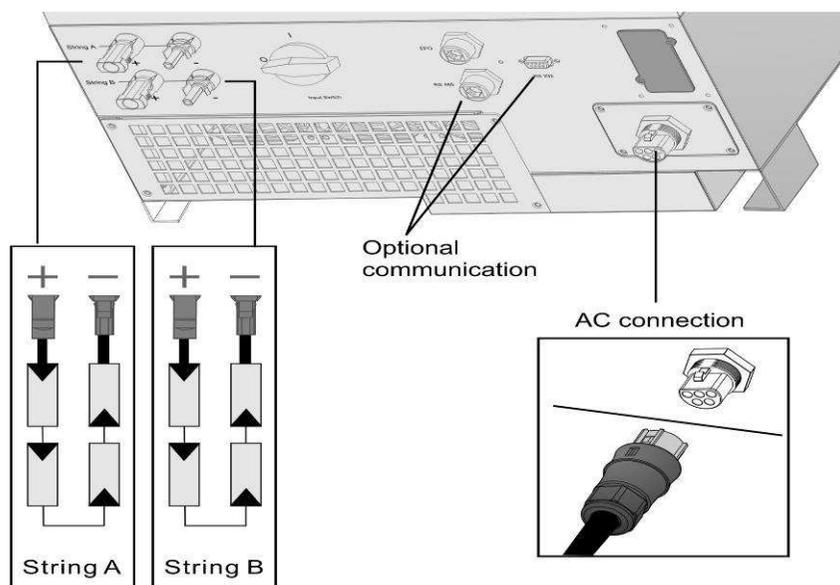
Figure 1

4.4.1 Connecting to the grid (AC utility)

 Caution:

Before connecting to Grid(AC utility),please install a separate circuit breaker between inverter and Grid

To connect the AC power cable proceed as follows:

Step 1. Measure the grid's (i.e., the utility's) voltage and frequency. The voltage and frequency of the inverter are set at the factory to match the utility in the country where the product will be delivered.

Step 2 .Before wiring the PV inverter ensure that the main breaker in the primary utility breaker box is switched OFF. Switch this breaker ON only after all wiring is completed as instructed below.

Step 3 .Remove the screws that secure the wire terminal cover, and carefully remove the cover. Alternatively, remove the connector as shown in Figure 2.
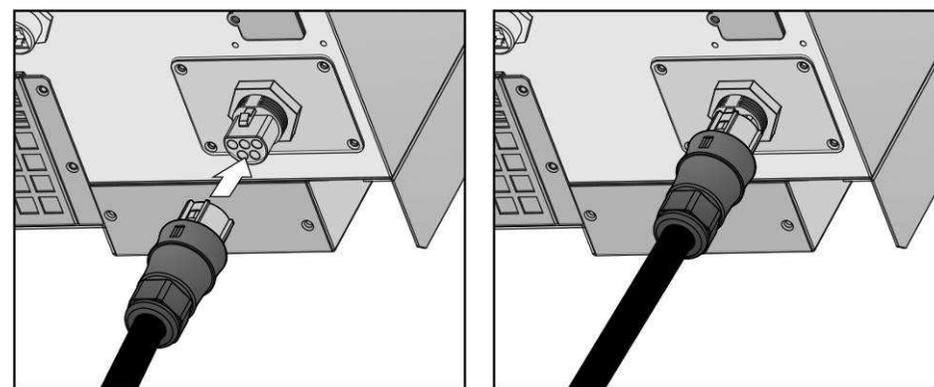

Figure 2

Step 4. Insert the utility cable through the cable gland. Connect the wires to the terminal block as shown in Figure 3.
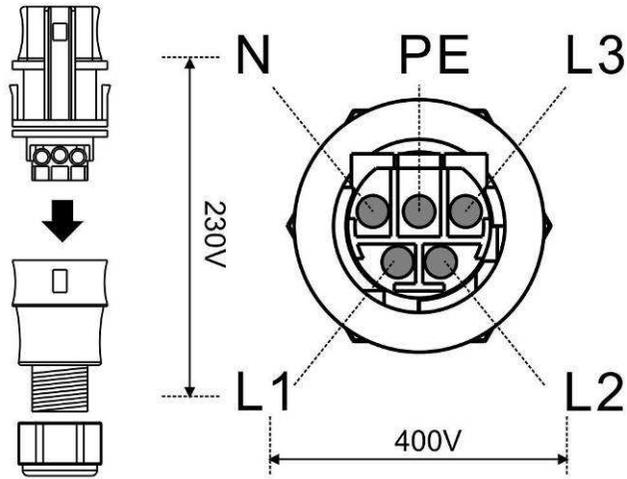

Figure 3

Step 5. Reattach the cover, and evenly tighten the four screws.

Warning: To prevent risk off electric shock ensure that the ground (PE) wire is properly earthed before operating the PV inverter.

Suggested AC cable width

Model	Area (mm^2)	AWG no.
ES 6000	> 2.1	< 14
ES 8000	> 2.1	< 14
ES 10000	> 3.5	< 12
ES 12000	>3.5	<12

4.4.2 Status identification of the DC input switch

Before operating the DC input switch, make sure of status identification as below instructions .

Turn the DC switch 90° to the **on** position (position **I**) shown in Figure 4

Turn the DC switch 180° to the **off** position (position **0**). shown in Figure 5

Input Switch

Figure 4

Input Switch
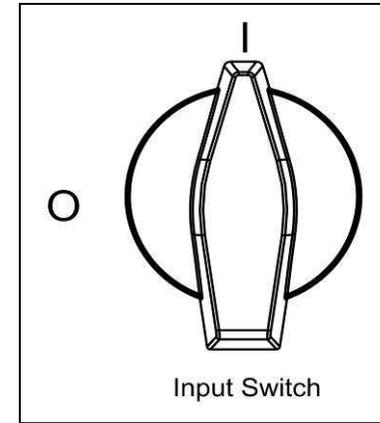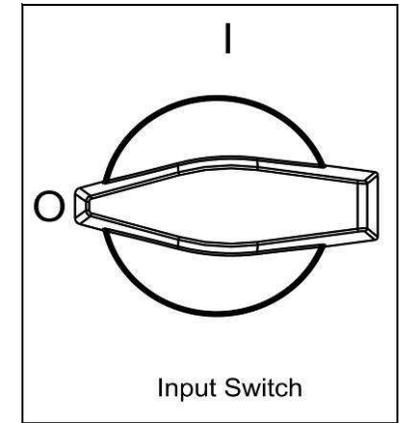
Figure 5

4.4.3 Connecting the PV array (DC)

4.4.3.1 PV array requirements

The ES 6000(ES 8000/ES 10000/ES 12000) PV inverter is designed to be connected to an array of up to two PV strings. The two PV strings can contain different numbers of PV modules.

4.4.3.2 Wiring to the PV array

The PV inverter is equipped with PV quick connects for connecting up to two PV strings as shown in Figure 6.

⚡ Caution:

Before connecting to PV modules, please install a separate circuit breaker between PV inverter and PV modules.

PV Quick Connects
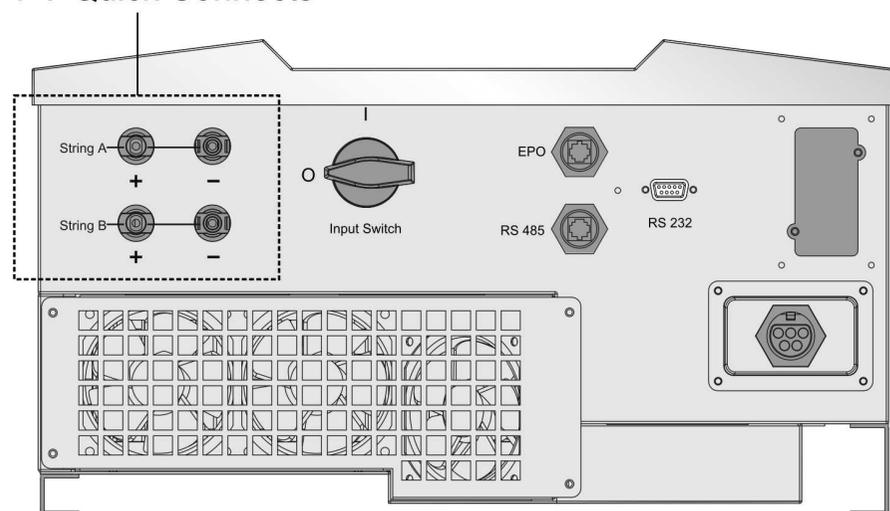
Figure 6

When matching PV strings to the PV inverter, to determine the number of panels required in each PV string (panels connected in series), you must ensure that the following three requirements are met:

1. To avoid damage to the inverter make sure that the maximum open circuit voltage (Voc) of each PV string is less than 1,000 VDC under any conditions. Voltage over 1,000 VDC will damage the inverter.

2. Do not exceed the maximum array short-circuit current rating marked on the inverter.

3. To harvest maximum energy from your array ensure that the Vmp (voltage at maximum power) does not drop below 450 VDC or increase above 850 VDC under most conditions.

To wire the PV array to the PV inverter follow these steps:

Step 1: Set the DC input switch to **0**

(Turn the DC input switch to off position,referring to section 4.4.2 Figure 5)

Step 2: Check that the PV generator connectors have the right polarity and do not exceed the maximum string voltage.

Step 3: Connect the POSITIVE (+) wire from the #1 PV string to the PV inverter's positive (+) terminal.

Step 4: Connect the NEGATIVE (–) wire from the #1 PV string to the PV inverter's negative (–) terminal.

Step 5: Connect the ground wire from the #1 PV string to earth.

Step 6: If necessary repeat steps 2 through 5 for the #2 PV string. Double-check that the wires are in the proper locations.

Suggested DC cable width

Model	Area (mm²)	AWG no.
ES 6000	> 4.0	< 12
ES 8000	> 4.0	< 12
ES 10000	> 4.0	< 12
ES 12000	> 4.0	< 12

4.4.3.3 Requirements for connection

The number of solar panels in String A need not equal the number in String B.
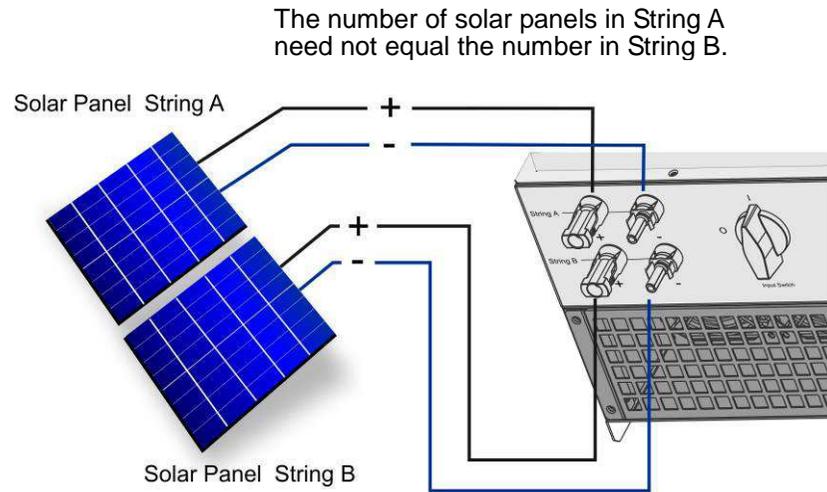
For a single PV string enter settings mode and configure for parallel operation.
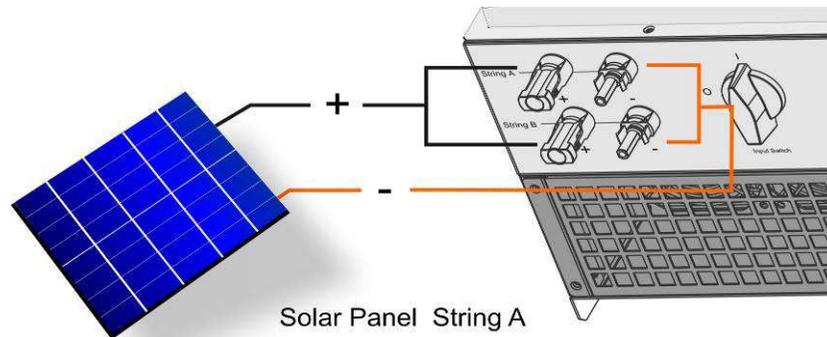
Figure 7. DC connections for a two-string PV array

5 Front display panel
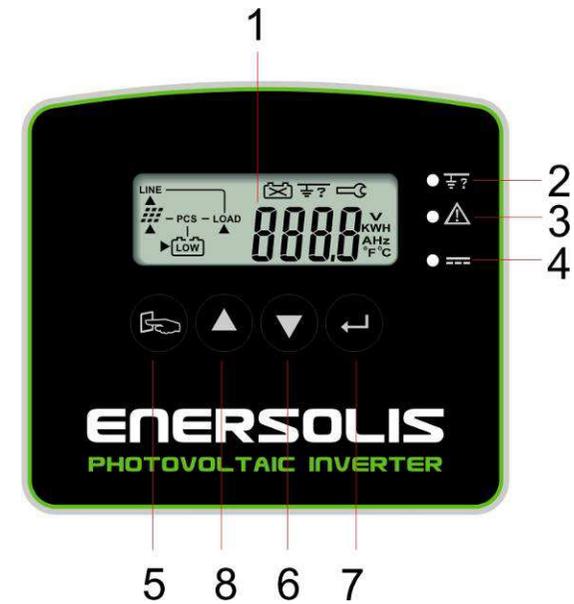
Symbols on the LCD

① LCD	
Symbol	**Description**
LINE	Utility source
⌐⟨	Inverter is working in specified mode.
▦	Solar cell
(operation mode flow chart)	Inverter operation mode flow chart
88.88	4-digit measurement display

LED Indicators		
②	🔻?	Red LED shines steadily to indicate a ground fault or DC input isolation fault.
③	⚠	Yellow LED shines steadily to indicate that the utility does not match the input standard of the inverter (voltage, frequency, etc.).
④	— — —	Green LED shines steadily when the solar power is greater than sleep power. It flashes when the solar power is less than sleep power.
Control Keys		
⑤	👉	Special functions and log in/out
⑥	▼	Go to next page.
⑦	↵	Confirm change of inverter setting.
⑧	▲	Go to previous page.

6 Starting the inverter

Before the inverter is started ensure the following:

- The wire terminal cover is securely screwed on.
- The AC breaker is OFF.
- The DC cables (PV strings) are fully connected.
- The AC (utility) cable is connected correctly.

6.1 Start-up and operation test

6.1.1 Connect the PV string voltage by switching on the DC switch, referring to section 4.4.2. Figure 4. The inverter starts automatically when it senses DC voltage greater than 250 VDC. All of the LEDs will shine. The LCD will display drawing A.

A
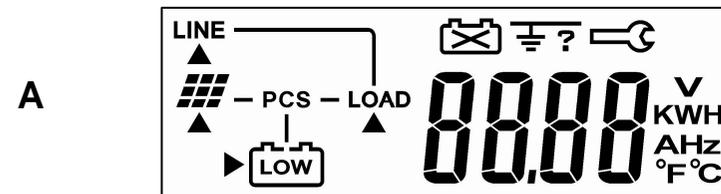
6.1.2 After three seconds the LCD will change from drawing A to drawings B1 and B2. The green LED will flash to indicate that the DC input power is less than sleep power. The yellow LED will shine steadily to indicate the absence of utility power.

B1

B2
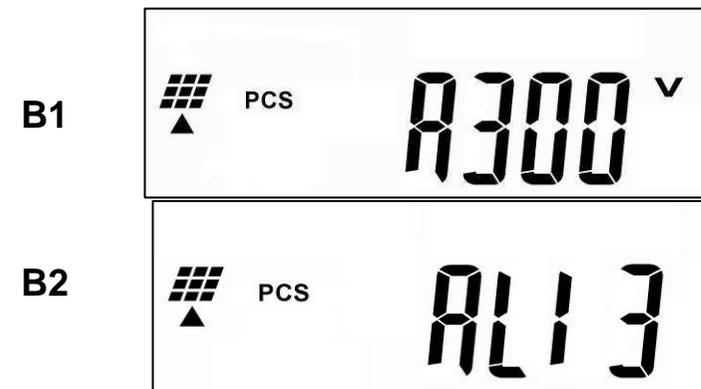
6.1.3 Turn on the AC breaker. If the utility specification (voltage, frequency, etc.) matches the inverter, after thirty seconds the LCD will display drawing C, and the yellow LED will stop shining, indicating that the utility is acceptable to the inverter. If the utility does not match the inverter then an error code or error status will appear on the screen.

C — LINE / PCS — **A300** V
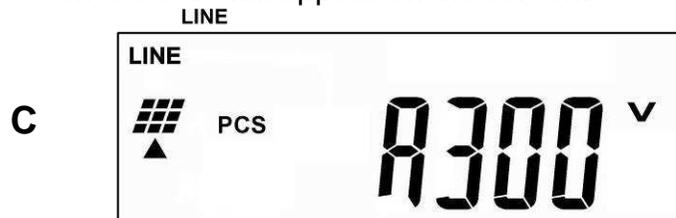
6.1.4 After five seconds, if the inverter's DC soft start is successful, the LCD will display drawing D. The green LED will still flash.

D — LINE / — PCS — **A300** V
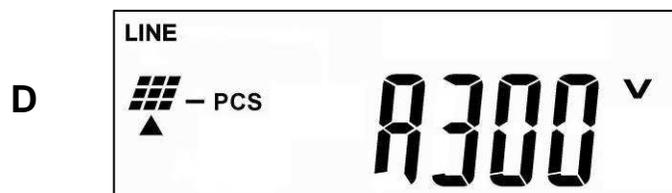
6.1.5 After ten seconds, if the inverter's AC soft start is successful, the LCD will display drawing E.

E — LINE / — PCS — LOAD **A300** V
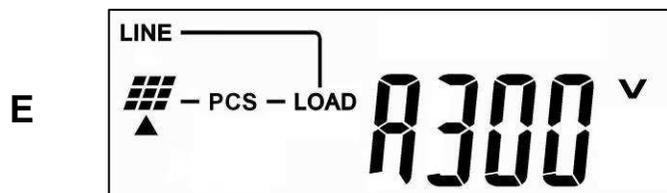
**6.1.6** If the inverter encounters a problem (e.g. output current over range) then an error code or error status will appear on the screen. (e.g. drawing F)

F — LINE / PCS LOAD **Er09**
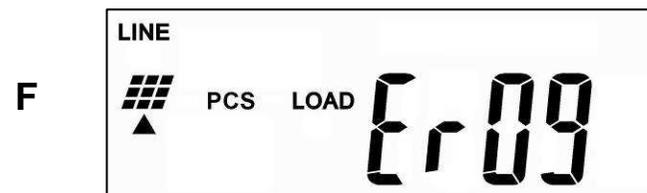
6.1.7 Upon successful completion of the start-up operation the LCD will display drawing E.

6.2 Checking values measured by the inverter

To check values measured by the inverter use the scroll-up ▲ and scroll-down ▼ keys. When you scroll down, the LCD will display the following:

6.2.1 Input DC voltage of string A

G — **A500** V
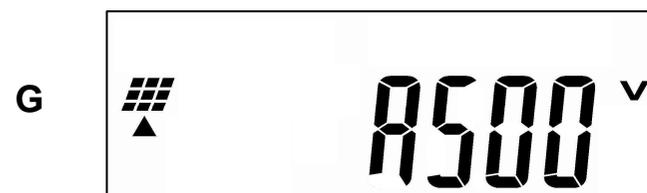
6.2.2 Input DC voltage of string B

H — **b500** V
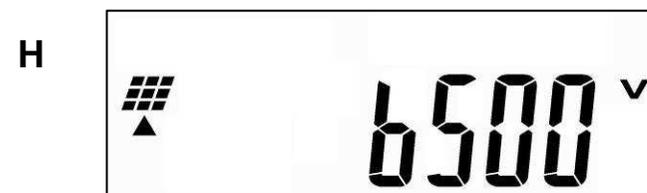
6.2.3 Input DC current of string A

I | ▦ ▲ $A\ 15$ A
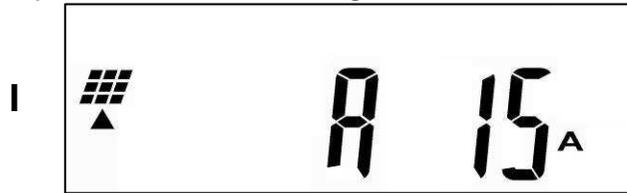
6.2.4 Input DC current of string B

J | ▦ ▼ $b\ 15$ A
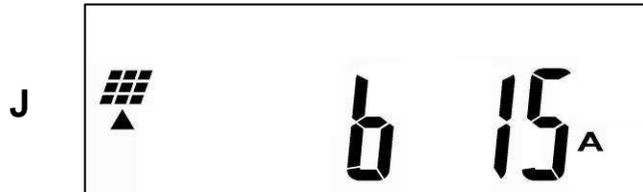
6.2.5 Output power of booster A

K | ▦ ▲ $A5.00$ KW
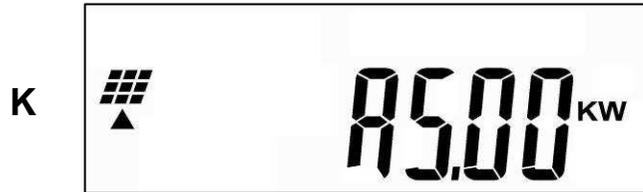
6.2.6 Output power of booster B

L | ▦ ▲ $b5.00$ KW
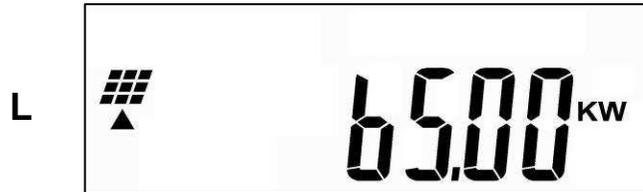
6.2.7 Output voltage A of the inverter (utility voltage)

M | LINE ▲ $230A$ V
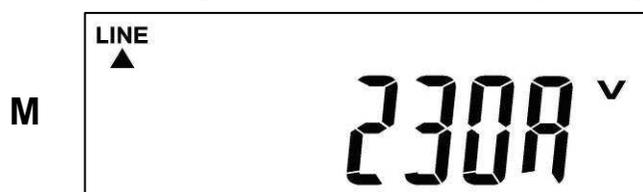
6.2.8 Output voltage B of the inverter (utility voltage)

N | LINE ▲ $230b$ V
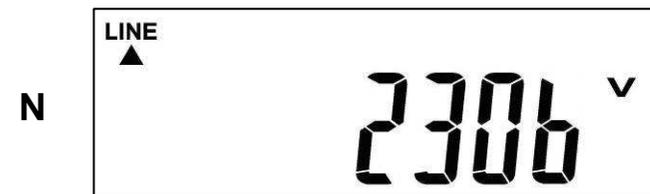
6.2.9 Output voltage C of the inverter (utility voltage)

O | LINE ▲ $230C$ V
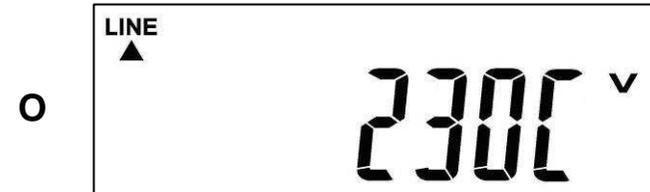
6.2.10 Output frequency of the inverter (utility frequency)

P | LINE ▲ 50.0 Hz
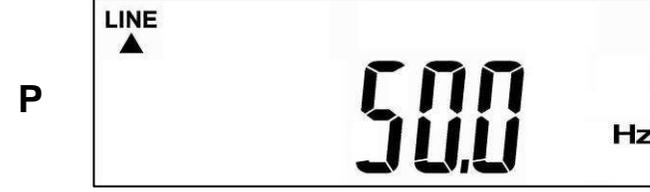
6.2.11 Output current A supplied to the load

Q | LOAD ▲ $25.0A$ A
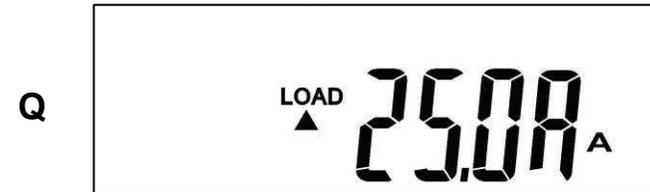
6.2.12 Output current B supplied to the load

R | LOAD ▲ $25.0b$ A
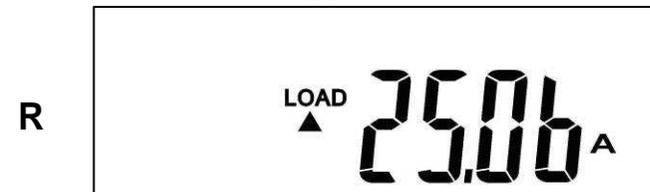
6.2.13 Output current C supplied to the load

S

LOAD ▲ **25.0C** A
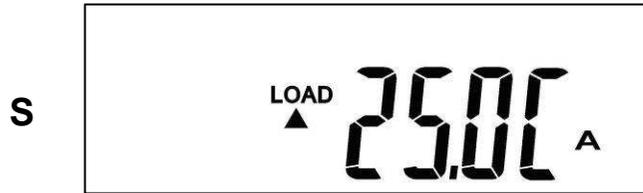
6.2.14 Output power supplied to the load

T

LOAD ▲ **5.00** KW
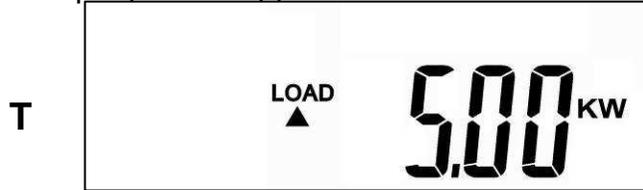
6.2.15 Energy in kWh supplied to the load

U

LOAD ▲ **9999** KWH
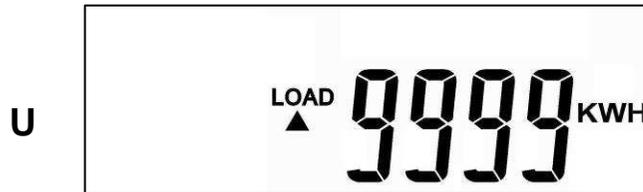
6.2.16 Inverter inner temperature (in either ℉ or ℃) (℉ or ℃ display change from scroll up and scroll down)

V

PCS **C200** °F°C
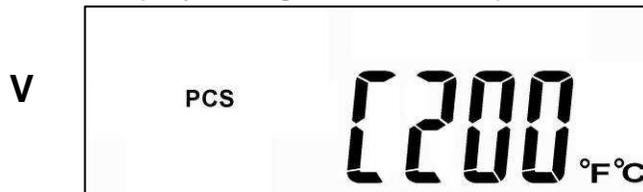
6.2.17 Heat sink temperature (in either ℉ or ℃) (℉ or ℃ display change from scroll up and scroll down)

W

PCS **H200** °F°C

6.3 Inverter status indicators

The PV inverter starts up automatically when DC power from the PV array is greater than **250 VDC**. Once the PV inverter starts, it enters into one of the following modes:

Operation mode	LCD	Description
Normal	LINE — PCS — LOAD ▲ **A300** V	The PV inverter is working normally. Whenever the PV-array voltage is within range (300-1,000 VDC), the PV inverter passes power to the grid as generated by the PV array. In normal mode the green LED shines to indicate that the inverter is feeding power to the grid.
Standby	LINE PCS ▲ **A250** V	If the voltage is insufficient (250-300 VDC) the PV inverter enters into standby mode.
Error	PCS ▲ **AL13** LINE PCS LOAD ▲ **Er10**	The internal intelligent controller continuously monitors and adjusts the system status. If the PV inverter encounters unexpected conditions such as grid problems or internal failure, it will display relevant information on the LCD, and the red LED will shine.
EPO	LINE PCS LOAD ▲ **Er06**	Emergency Power Off mode. In this mode the PV inverter does not take any power from the grid.
Shutdown		In case of little or no sunlight the PV inverter automatically stops running. In this mode the PV inverter does not take any power from the grid. The LCD and all of the LEDs on the front panel do not work.

7 Communication interfaces

7.1 Standard communication interfaces

7.1.1 RS-232 interface definition

The RS-232 interface must be configured as follows:

Baud Rate	9600 bps
Data Length	8 bits
Stop Bit	1
Parity	None

RS-232 Pin assignments are as follows (The connector is male.)
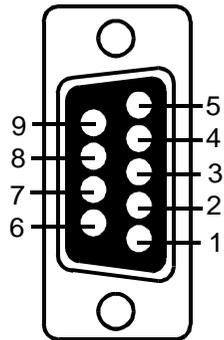
Pin 2: RS-232 Rx

Pin 3: RS-232 Tx

Pin 5: Ground

7.1.2 RS-485 interface definition

The RS-485 interface must be configured as follows:

Baud Rate	9600 bps
Data Length	8 bits
Stop Bit	1
Parity	None

RS-485 pin assignments are as follows:
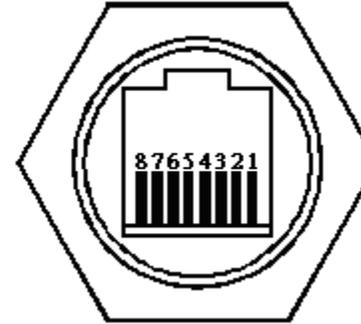
PIN 3 = 485 GND
PIN 4 = EPO GND
PIN 5 = EPO
PIN 7 = 485 A/Data+
PIN 8 = 485 B/Data-

7.1.3 EPO (Emergency Power Off) RJ45 connector

To activate EPO pin 4 and pin 5 must be shorted.

	Make sure the RJ45 plug is properly attached to the wire. Ensure that the EPO function operates properly with your application by testing the inverter while it is injecting current. Check that the inverter stops injecting current.	

7.2 Optional communication card

7.2.1   Hardware installation procedure

⚡ **Caution ! Risk of electric shock !**

■ When working on the solar power system, disconnect the AC
  breaker or switch.

■ Turn the DC input switch to off position, referring to section 4.4.2.
  Figure 5

■ Make sure that the AC breaker or switch cannot be unintentionally
  closed during installation and commissioning works.
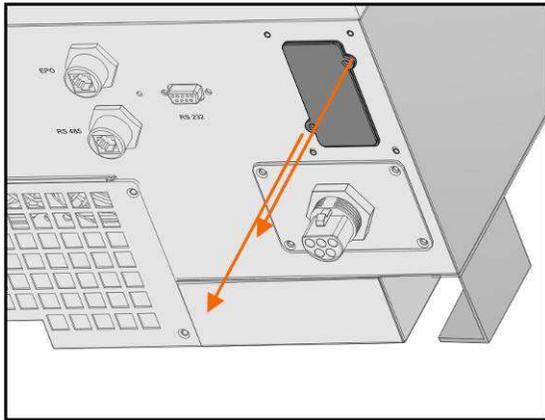
Unscrew the two screws,
and remove the cover.
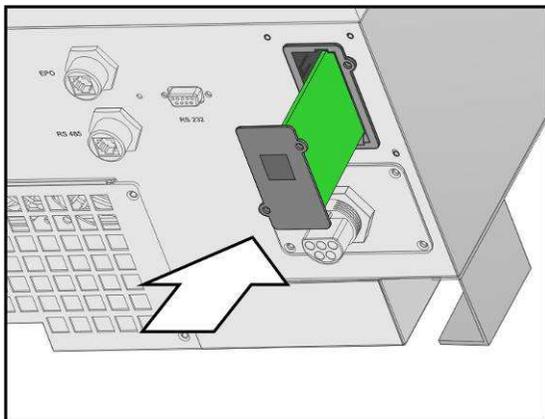
Insert the communication
card into the slot.
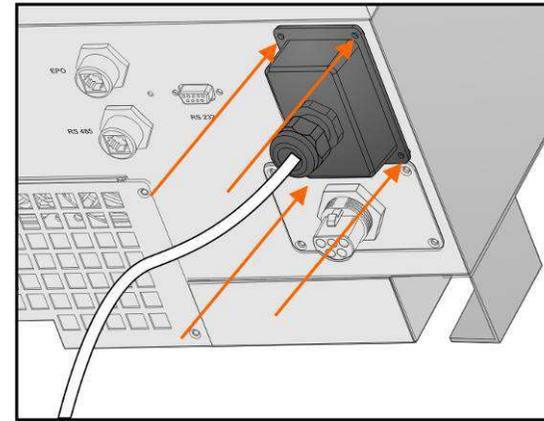
Screw on the cover to
complete the installation.

7.2.2   RS-485 card
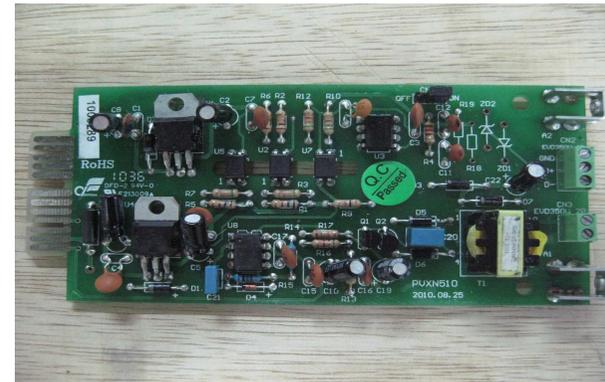
Jumper block CN2 is for the terminal resistor function.

Short pins 1 and 2 to enable the function.

Short pins 2 and 3 to disable it.

Jack CN3 is the RS-485 terminal.

Definition:

CN2

1	2	3

1 → Ground

2 → A/Data+

3 → B/Data−

7.2.3 USB card
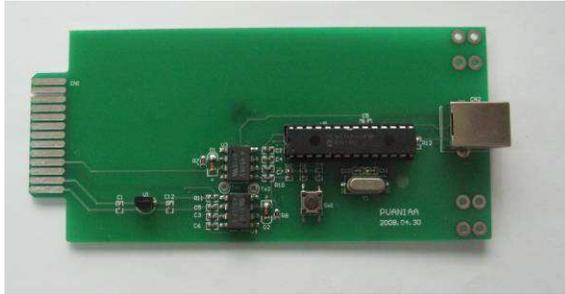
7.2.3.1 Jack CN2 is for USB.
7.2.3.2 Definition:
7.2.3.3 Complies with USB version 1.0 and 1.5 Mbps.
7.2.3.4 Complies with USB HID Version 1.0.
7.2.3.5 Pin assignments:
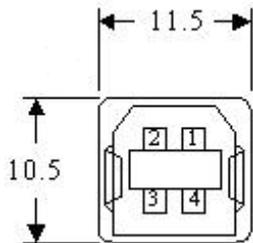
1 → VCC (+5 V)

2 → D−

3 → D+

4 → Ground

7.2.4 True Relay Contact Board (DCE-B card)
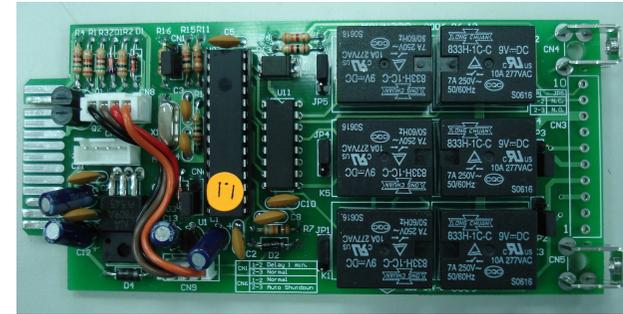
7.2.4.1 Pin assignments of the 10-pin terminal:

1	2	3	4	5	6	7	8		

Pin 1: Utility voltage is abnormal.

Pin 2: PV array voltage is normal.

Pin 3: PV array voltage is abnormal.

Pin 4: Utility frequency is abnormal.

Pin 5: Anti-islanding

Pin 6: Inverter output current exceeds range.

Pin 7: Heat-sink temperature is too high.

Pin 8: Common

7.2.4.2 The capacity of each relay contact is 40 VDC/25 mA
.
7.2.4.3 Flexible signal output for N.C. (normally closed) or N.O.
(normally open) contact by shorting pins 1-2 or pins 2-3 on
jumper block JP1-5

7.2.5 TCP/IP Cards

7.2.5.1 TCP/IP (Ethernet) card

7.2.5.2 For installation please refer to the user's manual included with the card.

7.2.6 WiFi Cards

7.2.6.1 For installation please refer to the user's manual included with the card.

8 Remotely Communication

8.1 Grid PV-Inverter is equipped with power remotely communication interface and options. User can use software to monitor the status of inverter with PC with the following options.

8.1.1 RS485: To use it, you have to remove the RS485 cover on bottom side of Inverter. It is a DB8 socket. For the pin definition, please refer to 7.1.2.

8.1.2 Wired Ethernet: To install TCP/IP card, please refer to 7.2.5.

8.1.3 Wireless Ethernet: To install WiFi card, please refer to 7.2.6.

9 Inverter status diagnostics and repair

The PV Inverter is equipped with a self diagnostic system that automatically identifies many possible operational issues and displays information about them on the LCD. Therefore it is possible to quickly isolate technical problems and to distinguish between service codes related to the installation and service codes which are internal to the inverter. Whenever the diagnostic system identifies a particular issue the respective service code is displayed on the LCD.

Table 2. Inverter error codes and descriptions

LCD	Designation	Description	Repair
Er00	DC_BUS pre-charge failure	The inverter is in the soft start procedure, but the DC bus cannot reach and maintain anticipative charging voltage	1. Disconnect ALL PV (+) and PV (-) cables. 2. Wait for a few seconds. 3. After the LCD switches off reconnect and check again. 4. If the error code keeps recurring contact your local distributor.
Er07	DC_BUS over-voltage	The DC bus voltage is lower or higher than expected.	
Er08	DC_BUS under-voltage		
Er17	EEPROM ERROR on the control board	EEPROM data is wrong.	
Er22	Output relay failure	The inverter's output relay is abnormal.	
Er24	Output current sense failure	The inverter's output current fails to be detected.	
Er25	BOOSTER_A over-current	Over-current on the DC side. This fault code is displayed if the current in the DC network is larger than specified.	
Er26	BOOSTER_B over-current		
Er06	EPO	Inverter enters into EPO mode (Emergency Power Off).	1. Remove the short circuit occurring at the EPO terminal. 2. If the error code keeps recurring contact your local distributor.
Er09	Inverter output over-current	Over-current on the AC side. This fault code is displayed if the current in the AC network is larger than specified.	1. Turn off the AC breaker, then check the peripheral AC system configuration and the grid conditions. 2. If the error code keeps recurring contact your local distributor for help.
Er11	Inverter overload	Overload on the AC side. This fault code is displayed if the load in the AC network is larger than specified.	
Er13	Inverter short circuit	Short circuit on the AC side	
Er14	Inverter PLL failure	The phase of the inverter cannot synchronize with the utility.	
Er29	Inverter output DC current over spec.	The DC component of the electricity fed into the grid is larger than the permissible range.	
Er10	Inverter Over temperature	The internal temperature is too high.	1. Try to reduce the ambient temperature. 2. Move the inverter to a cooler place.
Er18	Heat sink over temperature	The heat sink temperature is too high.	3. If the error code keeps recurring contact your local distributor for help.
Er02	Slave MCU failure	Slave MCU failure	1. If the error code keeps recurring contact your local distributor for help.
Er05	Watch Dog	DSP Watch Dog	
Er12	Charger fault	DC BUS pre-charge failure	
Er15	Slave Info fail	The data check failed between two MCUs.	
Er27	Booster Short Circuit	Short-current on the DC side.	
Er41	Boost A Sense fault	Current sensor fault on the stringA of DC side.	
Er42	Boost B Sense fault	Current sensor fault on the stringB of DC side.	
Er43	Out Balance Sense fault	Current sensor fault on the AC side.	
Er37	Fan fault	A fan is not rotating.	1. Check the fans. 2. If the error code keeps recurring contact your local distributor for help.

Table 3. Grid fault alarm codes and descriptions

LCD	Designation	Description	Repair
AL00	Utility over-voltage	The utility voltage is greater than or less than the permissible values.	1. Wait for 1 minute. If the grid returns to normal then the inverter automatically restarts. 2. Check the grid connection, such as wires and connectors. 3. Make sure the grid voltage and frequency meet the specifications. 4. If the error code keeps recurring contact your local distributor for help.
AL01	Utility under-voltage		
AL02	Utility over-frequency	The utility frequency is greater than or less than the permissible values.	
AL03	Utility under-frequency		
AL04	BOOSTER_A input over-voltage	Over or under voltage at DC input	1. Disconnect ALL PV (+) and PV (-) cables. 2. Ensure that the open PV voltage is outside the 300-1000 VDC range. 3. If PV voltage is normal and the problem still occurs contact your local distributor for help.
AL05	BOOSTER_A input under-voltage		
AL06	BOOSTER_B input over-voltage		
AL07	BOOSTER_B input under-voltage		
AL08	Anti-islanding	No utility, or utility failure	1. Disconnect ALL PV (+) and PV (-) cables. 2. Check the grid connection, such as wires and connectors. 3. Check for grid usability. 4. If the utility is normal and the error code keeps recurring contact your local distributor for help.
AL 13	Utility phase failure		
AL10	GFDI	Leakage current on the ground conductor is too high.	1. Unplug the PV generator from the input. Check the AC peripheral system. 2. After the problem is cleared re-plug the PV generator. Check the PV inverter status. 3. If the error code keeps recurring contact your local distributor for help.
AL11	Isolation fault	The impedance between PV (+) and PV(-) and ground is less than 1 MΩ.	1. Disconnect ALL PV (+) and PV (-) cables. 2. Check the impedance between PV (+) and PV (-) and ground. The impedance must be greater than 2 MΩ. 3. If the error code keeps recurring contact your local distributor for help.
AL23	PV Inverter is under initialization	PV Inverter is under initialization	N/A

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10 Specifications

Item \ Model		ES 6000	ES 8000	ES 10000	ES 12000
Inverter Technology	Conversion Mode	Sine-wave, Current source, High-frequency PWM			
	Isolation Method	Transformer-less Design			
DC Input Data					
Nominal DC Voltage		620 VDC			
Max. DC Input Voltage		1,000 VDC			
MPP Voltage Range		300 ~ 1,000 VDC			
Max. DC Input current		2 × 8.5 Amp	2 × 11.4 Amp	2 × 14.3 Amp	2 × 14.3 Amp
MPP Tracker		2			
Isc		35A			
AC Output Data					
Nominal AC Power		6,000 Watt	8,000 Watt	10,000 Watt	12,000 Watt
Max. AC Apparent Power		6,600 VA	8,800 VA	11,000 VA	12,000 VA
Nominal AC Voltage		AC 230V × 3			
Output Connect Method		3-Phase / 4-Wires (L1, L2, L3, N, PE)			
AC Voltage Rang		184V ~ 264.5V (Base on 230 Vac)			
Nominal AC Current		8.69 Amp × 3	11.59 Amp × 3	14.49 Amp × 3	17.39 Amp × 3
Frequency		50 / 60Hz Auto-Selection (45.0 ~ 55.0Hz or 57.0 ~ 63.0Hz)			
Power Factor		Leading 0.9 ~ Lagging 0.9			
Current Distortion		Total Harmonic Current : Less than 5% Single Harmonic Current : Less than 3%			
Efficiency Data					
Max. Efficiency		97.60%			
Euro Efficiency		96.20%	96.60%	97.00%	97.25%
Environmental					
Operating Temperature		-20 °C to +60 °C			
		-4 °F to 139°F			
Pollution degree		PD3			
Overvoltage category (IEC 60664-1)	DC side	Category Ⅱ			
	AC side	Category Ⅲ			
Humidity		0 to 100% (Without condensation)			
Altitude		0-2,000 m / 0-6,600 ft			
Mechanical					
Dimensions (W x H x D in mm / in)		451 × 595 × 247 / 17.7 × 23.4 × 9.72			
Net Weight (kg / lbs)		41 / 90.4			
Gross Weight (kg / lbs)		44 / 97.0			
Protection Class		IP65, outdoor			
Cooling		Temperature-dependent fan			
AC connector		Connector			

DC Connector	Connector		
Communication			
Communication Interfaces	Standard	RS-232 & RS-485	
	Optional	USB, RS-485, Dry contact, TCP / IP, WiFi	
Front Panel			
LCD	Boost input Voltage / Boost input Current / Boost input Power / AC output Voltage / AC output frequency / AC output current / AC output power / AC Energy / yield / Inner Temperature / Heat sink Temperature / Status message / Error message		
LED	RED	On: Ground fault or DC input insulation fault	
	Yellow	On: Unit Error or Alarm	
	Green	Flash: Standby or Sleeping mode On: Normal Operation	
Key Pad	Up key / Down key / Function key / Enter key		
Protection			
Utility	Over / under Voltage, Over / under Frequency, Ground fault, DC Isolation fault		
Islanding operation detection	Passive: Voltage phase jump detection		
	Active: Reactive power control		
Over temperature	Downgraded output power		
Certification			
On-Grid Performance	VDE 0126-1-1, VDE AR-N 4105, AS 4777.2/.3 ENEL 2010, G83/1		VDE 0126-1-1, VDE AR-N 4105
Safety	EN 62109-1, EN 62109-2, EN 60730, AS 3100		
EMI/EMC	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3		

11 Contact

Ablerex Electronics Co., Ltd.

1F, No. 3, Lane 7, Paokao Rd., Hsintien,

23114, Taipei Hsien, Taiwan

Note:

1. This product can cause current with a d.c. component. Where a residual current operated protective (RCD) or monitoring (RCM) device is used for protection in case if direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product.

2. The PV modules must be have an IEC 61730 Class A rating.